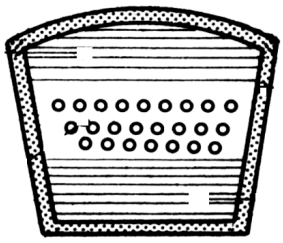
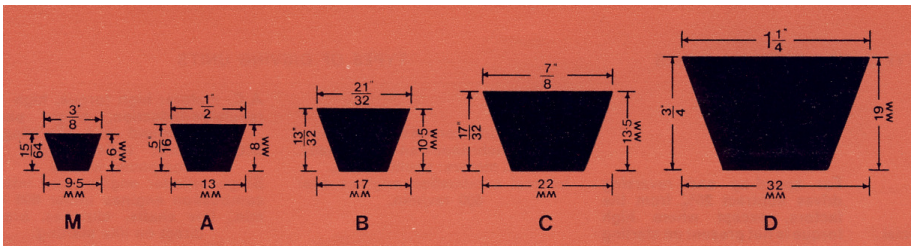
Belt Drives

V-Belts

V-Belt Cross Section



V-Belts – Grades of Belt Sizes



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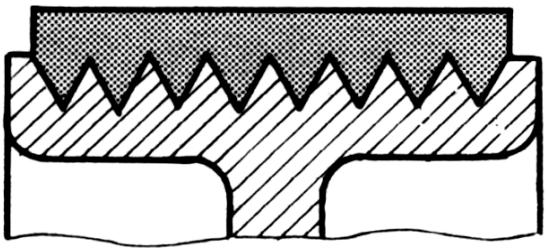
Poly V-Belts



Mostly used with domestic appliances and agricultural equipment

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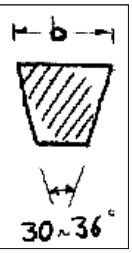
V Belts

Advantages of V Belts as compared with Flat belt drives:

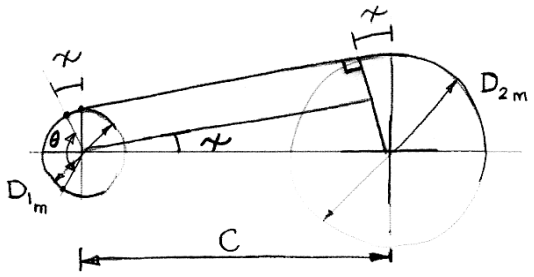
1. **High speed ratios.**
2. **Short centre distance drives.**
3. **Small amount of slip.**
4. **Higher capability for transmitting power for same maximum belt tension.**
5. **Suitable for horizontal, vertical and inclined drives – nearly no slackening occurs.**
6. **Smaller angles of contact are required.**

Shape of belt .....

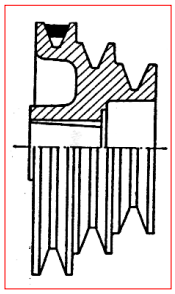
Size designation ..... b * h * ℓ

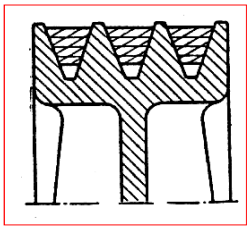


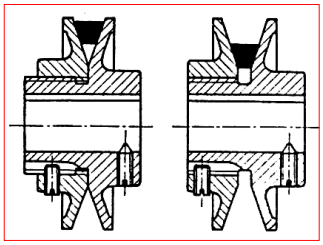
V Belts

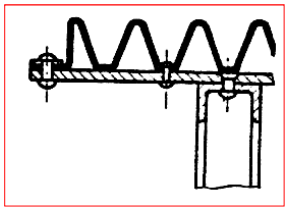


V Belt Pulleys









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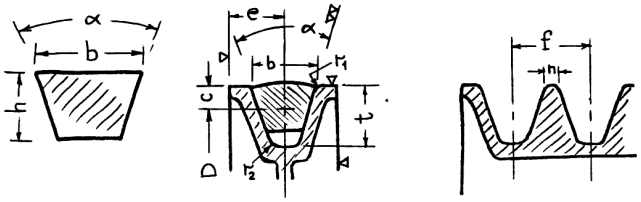
V Belts - Standards

Dimensions of normal V-belt grooves DIN 2217 mm



bxh	c	e max	f	n	r_1	r_2	t min	D min 34° α	D min 36° α
5x3	1.5	6	6	1	-	0.5	5	22	50
6x4	2	7	8	2	0.5	0.5	6	32	71
8x5	2.5	8	10	2	0.5	1	8	45	100
10x6	3	10	12	2	0.5	1	10	63	140
13x8	4	12	16	3	1	1	12	90	200
17x11	5	15	20	3	1	1.5	16	125	280
20x12.5	6	18	24	4	1.5	2	18	180	400
22x14	7	20	26	4	1.5	2	20	212	475
25x16	8	22	30	5	1.5	2.5	22	250	560
32x20	10	27	38	6	2	3	27	355	800
40x25	12	34	46	6	2	4	32	500	1120
50x32	16	42	58	8	2.5	5	40	710	1600

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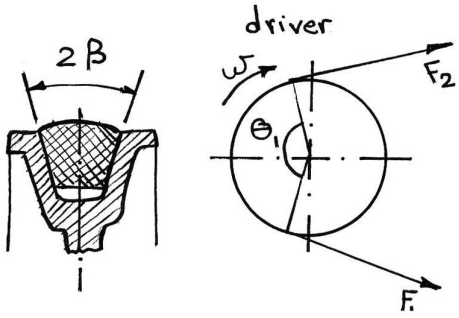
V-Belt Calculations

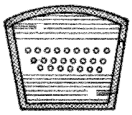
Wedge action phenomenon in V-Belts

F_1: Internal force at tight side
F_2: Internal force at loose side

$F_1 > F_2$



Torque = (F1 – F2) d/2



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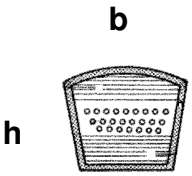
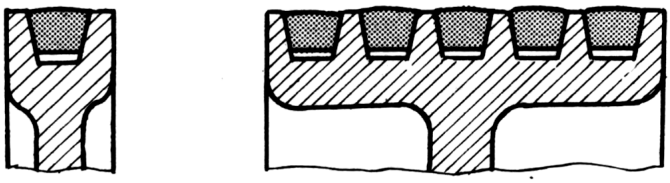
Calculation of Number of V-Belts





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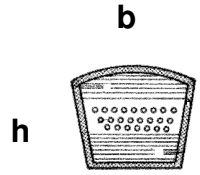
V-Belt Sizes
mm

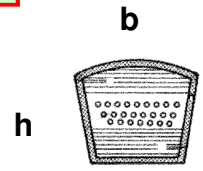


b	5	6	8	10	13	17
h	3	4	5	6	8	11

b	20	22	25	32	40	50
h	12.5	14	16	20	25	32

Service Factor for V-Belts

Shock free drives (m/c tools)	1.25
Moderate shocks (presses)	1.4
Heavy shocks (rolling mills)	1.5
Sudden shocks (cranes)	2.0



$$n = \frac{KW.K_s}{KW/belt.K_\theta}$$

Contact Angle Factor for V-Belts

θ	180	170	160	150	140	130
K_θ	1.10	1.07	1.03	1.00	0.94	0.88

θ	120	110	100	90	80	70
K_θ	0.80	0.74	0.66	0.58	0.49	0.40

Transmitted Power per Belt, [Kw]

Belt velocity, m/s	Belt width, mm											
	5	**6**	**8**	**10**	**13**	**17**	**20**	**22**	**25**	**32**	**40**	**50**
2	0.018	0.037	0.074	0.140	0.272	0515	0.736	0.810	1.104	1.766	2.723	4.416
4	0.035	0.074	0.140	0.272	0.545	0.957	1.398	1.693	2.208	3.459	5.446	8.832
6	0.050	0.110	0.206	0.405	0.810	1.398	2.061	2.502	3.238	5.152	8.096	13.25
8	0.063	0.140	0.265	0.530	1.030	1.840	2.723	3.238	4.195	6.771	10.30	16.93
10	0.074	0.162	0.316	0.640	1.251	2.282	3.312	3.901	5.078	8.170	12.51	20.61
12	0.081	0.184	0.353	0.736	1.472	2.650	3.827	4.490	5.888	9.421	14.72	23.55
14	0.081	0.191	0.383	0.810	1.619	2.944	4.269	5.152	6.624	10.60	16.19	26.50
16	0.081	0.199	0.412	0.883	1.766	3.165	4.637	5.520	7.213	11.56	17.66	28.70
18	0.074	0.191	0.412	0.883	1.914	3.386	4.931	5.888	7.654	12.22	19.14	30.91
20	0.059	0.177	0.397	0.957	1.987	3.533	5.078	6.035	7.875	12.59	19.87	31.65
22	0.037	0.155	0.361	0.883	1.987	3.533	5.152	6.109	8.022	12.73	19.87	32.38
24	-	0.110	0.309	0.810	1.914	3.459	5.005	6.035	7.581	12.51	19.14	32.38
26	-	0.059	0.221	0.736	1.840	3.312	4.784	5.741	7.434	11.85	18.40	30.18
28	-	-	0.132	0.66	1.693	3.018	4.416	5.226	6.845	10.89	16.93	27.23
30	-	-	-	-	1.472	3.650	3.754	4.563	5.888	9.568	14.72	23.55

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